

CLAIMS

I claim:

1. A material handling vehicle, comprising:
 - a drive system controlled by the operator to drive the material handling vehicle in a selected direction;
 - a steering mechanism coupled to the drive system and controlled by the operator to select a direction of motion, the steering mechanism being moveable along an arc between a substantially horizontal position and a substantially vertical position;
 - an operator control for selecting a speed of the vehicle;
 - a brake coupled to the drive system to prevent motion of the material handling vehicle;
 - an angular position indicator activated by the steering mechanism as the steering mechanism is moved along said arc and providing a control signal indicating the angle of movement of the steering mechanism; and
 - a controller for receiving the control signal and for selectively placing the material handling vehicle in one of a plurality of successive driving states based on the angle of movement of the steering mechanism.
2. The material handling vehicle of claim 1 wherein the driving states include at least a top braking mode, a slow speed mode, a fast speed mode, and a bottom braking mode.
3. The material handling vehicle as defined in claim 1, wherein at least two of the driving states are braking states and the controller applies the deadman brake in the braking states.
4. The material handling vehicle as defined in claim 1, wherein the angular position indicator comprises first and second switches and the control signal is a two bit code.
5. The material handling vehicle as defined in claim 4, wherein a first angle is indicated by activation of the first switch, a second angle is indicated by activation of the second switch, and a third angle is indicated by deactivation of the first switch.

6. The material handling vehicle as defined in claim 4, wherein the steering mechanism includes a cammed surface for selectively activating and deactivating each of the first and second switches as the steering mechanism is moved along the arc.

7. The material handling vehicle as defined in claim 2, wherein the controller limits the speed of the material handling vehicle to approximately one mile per hour when the material handling vehicle is in the slow speed mode.

8. The material handling vehicle as defined in claim 2, wherein the controller limits the speed of the material handling vehicle to approximately three and one half miles per hour when the material handling vehicle is in the fast speed mode.

9. The material handling vehicle as defined in claim 2, wherein the controller scales the speed received from the operator control based on a predetermined maximum when the material handling vehicle is in the slow speed mode.

10. The material handling vehicle as defined in claim 5, wherein the braking mode is activated at a first angle as the steering mechanism is rotated toward the vertical and at a second angle as the steering mechanism is rotated toward the horizontal.

11. The material handling vehicle as defined in claim 1, wherein the controller further monitors the operator control and drive motor operation for a delay in driving and, when no driving occurs for a period of time greater than a selected time period, applies the brake.

12. The material handling vehicle as defined in claim 2, wherein the controller transitions the driving state from the braking mode to the slow mode to the fast mode and back to the braking mode as the steering mechanism is moved between a substantially vertical and a substantially horizontal position.

13. The material handling vehicle as defined in claim 11, wherein the controller verifies that each transition between successive driving states is a valid transition based on the previous driving mode of the material handling vehicle as the steering mechanism is moved.

14. A pallet truck, comprising:

a steering mechanism moveable in an arc between a substantially horizontal and a substantially vertical position, the steering mechanism including a cammed surface;

a drive system coupled to the steering mechanism to drive the lift truck in a selected direction;

a variable speed control device for selecting a speed of the drive system;

a brake coupled to the drive system to prevent motion of the lift truck;

a switching device, the switching device being activated by the cammed surface of the steering mechanism to produce a control signal indicating at least a first, a second, and a third angle of rotation of the steering mechanism;

a controller for receiving the control signal and for changing a driving state of the pallet truck progressively from a top braking mode, to a slow speed mode, to a fast speed mode, and to a bottom braking mode as the steering mechanism is moved from the vertical to the horizontal position, respectively.

15. The pallet truck as defined in claim 14, wherein the switching device comprises a first and a second switch.

16. The pallet truck as defined in claim 14, wherein the first switch is activated at the first angle, the second switch is activated at the second angle, and the first switch is deactivated at the third angle to produce the control signal.

17. The pallet truck as defined in claim 14, wherein the controller monitors the changes in driving states to determine whether a transition between states is valid and applies the brake if an error has occurred.

18. The pallet truck as defined in claim 15, wherein the controller further monitors the variable speed control device and applies the brake if no speed request is received from the variable speed control device over a selected period of time.

19. The pallet truck as defined in claim 15, wherein the steering mechanism is spring loaded to return to a braking position.

20. A pallet truck, comprising:

a steering mechanism moveable in an arc between a substantially horizontal and a substantially vertical position;

a drive system coupled to the steering mechanism to drive the pallet truck in a selected direction;

a brake coupled to the drive system to prevent motion of the lift truck;

a first switching device, the switching device being activated by the steering mechanism as the steering mechanism is moved to produce a first binary control signal;

a second switching device activated by the steering mechanism as the steering mechanism is moved to produce a second binary control signal, the first and second switching devices together producing a two bit state code, the two bit state code providing four possible sequential driving states;

a controller electrically connected to the first and second switching devices to receive the two bit code, wherein the controller compares the two bit code to the present driving state code, determines if the transition is a sequential transition, applies the brake if the transition is not sequential, and enters the driving state represented by the two bit code if the transition is sequential.

21. The pallet truck as defined in claim 20, wherein the four driving states are a vertical braking mode, a slow speed mode, a fast speed mode, and a horizontal braking mode.

22. The pallet truck as defined in claim 20, wherein the controller further evaluates input signals from the operator control to determine whether the pallet truck has stopped

23. The pallet truck as defined in claim 22, wherein the controller determines that the pallet truck has stopped when no control signals are received from the switching device or the operator control for a selected time period.

24. The pallet truck as defined in claim 20, wherein the steering mechanism comprises first and second cammed surfaces for activating the first and second switches, respectively.

25. The pallet truck as defined in claim 20, wherein the controller applies the brake in the vertical and horizontal braking modes, enables motion within a high speed range in the fast mode, and enables motion within a low speed range in the slow speed mode.